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THE GEOGRAPHICAL REVIEW

VOL. I

MARCH, 1916

No. 3

THE DESCENT OF THE RIO GY-PARANÁ

By LEO E. MILLER

American Museum of Natural History
Member of Colonel Roosevelt's South American Expedition

It will be remembered that the Roosevelt-Rondon Expedition contemplated a division of work. The main party planned to explore the Dúvida, while a second party was to descend the Juruena and the Tapajoz, and a third party, of which the writer was a member, was to go down the Gy-Paraná. We had looked forward in eager anticipation to the end of the long ride across the Brazilian *chapadão* and the beginning of river work, but now that, thirty-seven days since leaving the upper Paraguay, the goal had been reached without serious mishap, the division of the expedition seemed to come all too soon.

To better organize the two different forces, our party had halted at a point called Sete de Setembro, ten kilometers this side of the Rio da Dúvida, while the other division had pushed on to the point of embarkation. We reached their camp early February 27, 1914, just as the tents were being taken down and the canoes loaded, preparatory to the plunge into the unknown. A short time later everything was in readiness, and farewells were exchanged with Colonel Roosevelt and with the Brazilian officers. Then, with a parting "good luck," their dugouts swung into the current and were whisked away. For several minutes we stood upon the fragile structure that bridged the unexplored river and stared at the dark forest that shut our erstwhile leader and his Brazilian companions from view; and then, filled with misgivings as to whether or not we should ever see them again, we turned our thoughts to the task before us.

Our party consisted of Captain Amilcar de Magalhães, a remarkably skilful and wholly tireless leader, and Lieutenant Joaquim de Melho, of the Brazilian Army, Dr. Euzebio Paulo de Oliveira, a geologist, and Senhor Henrique Heinisch, a taxidermist, of the Brazilian telegraphic commission, besides myself; then there were some thirty-odd *camaradas*, or native assistants. We had a very large pack train of mules and oxen, as that wing of the expedition in charge of Captain Amilcar which had

hitherto traveled ahead of the main party was to proceed with us from this point. Our plan was to continue overland to the headwaters of the Gy-Paraná and to descend that stream to the Madeira, taking observations as we went, for, in common with many of the rivers of the South American continent, the course of this stream has not been accurately mapped.¹ Zoölogically speaking, we were in a most interesting and almost unknown country, and no opportunity could be lost to add to our already large and constantly growing collection of both mammals and birds.

We left the Dúvida (now Rio Theodoro) shortly before noon; but it had rained nearly the entire day and the trail was indescribably bad; besides, the animals had completed their thirty-eighth day of travel without proper food or rest. That night we camped beside the trail on a site cleared for the purpose by the *camaradas*; we had taken only the canvas flies, as it had been found necessary to abandon the wall tents some little distance back on account of their great weight. There was no feed for the animals, but the men had cut a quantity of palm leaves growing abundantly in the forest, which the oxen refused to eat, however.

The trail had now left the open *chapadão* and wound between high walls of dark forest; instead of the monotonous level of the plain, the country was now broken and hilly, with numerous small streams trickling through the dividing ravines, and it rained almost continuously; if we had succeeded in evading the rainy season heretofore, it descended on us now with doubled vigor.

A very wide swath had been cut through the forest for the telegraph line to protect the wires from falling trunks and branches; so recent had been the work that the shriveled leaves still clung to the prostrate trees, and the thick second-growth, which springs up immediately where the sunlight is permitted to reach the ground, was just sprouting. The ground was covered with fruits of many kinds, most of them insipid or of acrid flavor, but the herds of peccaries seemed to relish them; and the flocks of parrots and macaws quarreled noisily overhead in their struggles to reach some particularly appetizing morsel. One of the things that especially attracted our attention was the great number of hard, cannonball-like shells that littered the trail; they were the empty casques of the *castanha*, or Brazil nut, which grew abundantly throughout the forest. The Indians had opened most of them, in what manner I am unable to say, as they are so hard the blows of a hammer fail to make any impression, and extracted the dozen or more triangular nuts from each. The trees upon which they

¹ The Gy-Paraná had been descended by two parties which Colonel Rondon detached for this purpose from his main expedition of 1909. The first, under the zoölogist Alípio de Miranda Ribeiro, went down the Pimenta Bueno and the Gy-Paraná to the Madeira; the second, under Lieut. Antonio Pyrineus de Souza, descended the Jarú and the Gy-Paraná (see map, Fig. 1). It was the reconnaissance survey made by the first party that established the fact that the Gy-Paraná, instead of flowing northwest throughout its course, as until then supposed, turns abruptly north in $11\frac{1}{4}^{\circ}$ S. lat. and flows in this direction for nearly three degrees, until, at another abrupt bend in 9° S., it turns west and empties into the Madeira.—
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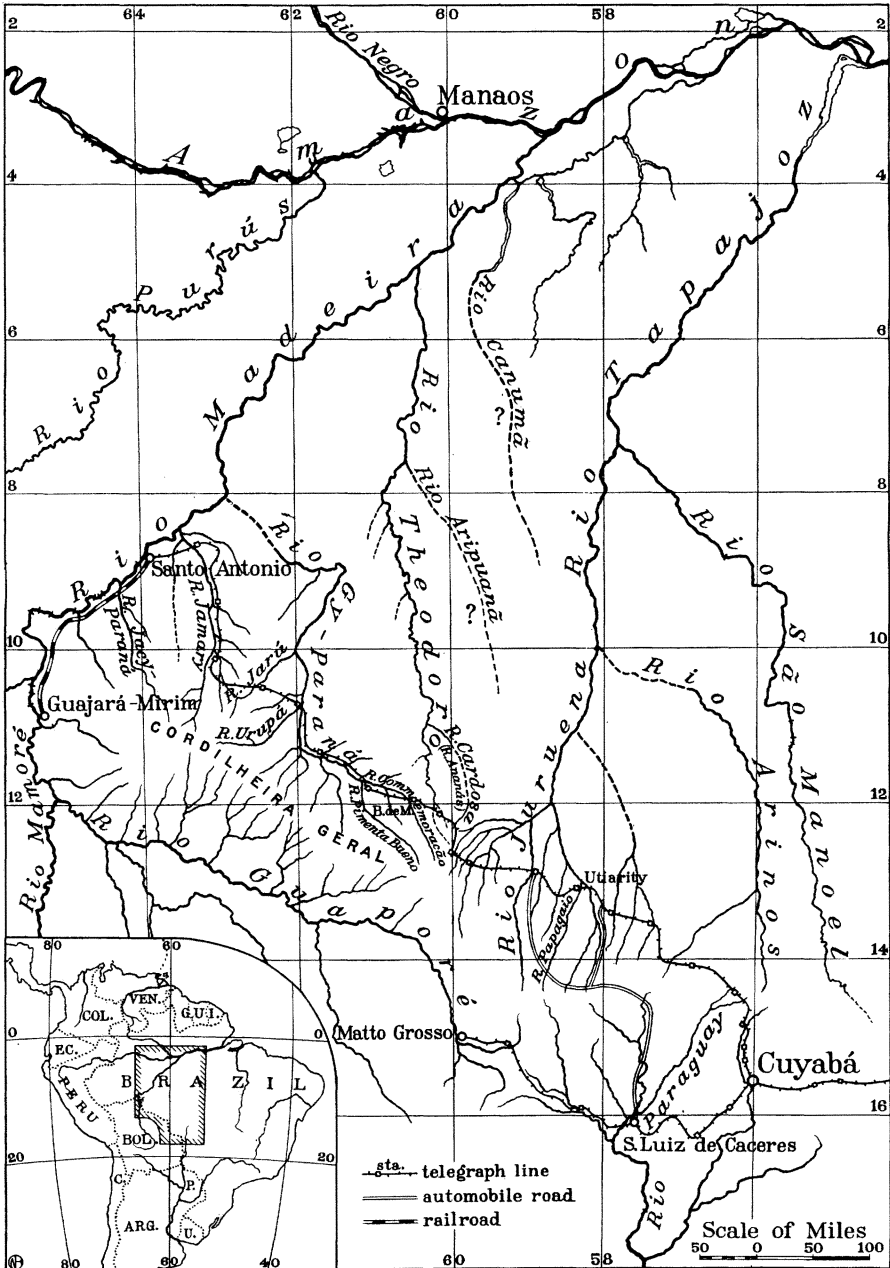


FIG. 1.—Sketch map of the south-central part of the Amazon drainage system. Scale, 1:12,000,000.

The party of which the writer was a member, after leaving the main body of the Roosevelt-Rondon Expedition, descended the Rio Comemoracão and the Gy-Paraná to the Madeira. From here Manóas on the Amazon was reached by the regular steamer route down the Madeira.

The drainage between the upper Paraguay and the Madeira is based on the surveys of the Brazilian Telegraph Commission, so far as available. Note the recently explored course of the Rio Ananás (*The Geogr. Rev.*, Jan., 1916, p. 50, and Feb., pp. 143-144) and the completed telegraph line from Cuyabá to Santo Antonio (*Bull. Amer. Geogr. Soc.*, Sept., 1915, p. 693). The latter is taken from a map in the Rio de Janeiro newspaper *A Noite* for October 25, 1915.—EDIT. NOTE.

grow are remarkable for their height and great thickness; not infrequently we saw one a hundred and fifty feet high and four feet in diameter without a single branch lower than sixty or seventy feet. Graves were numerous by the wayside; I counted fifteen, near one another, each newly made mound being marked by a rude cross without name or inscription; they indicated the burial sites of *camaradas*, victims to the dread beri-beri and malaria.

During our second night's camp we heard the gruff, cough-like roar of a jaguar not far away, and next morning the men reported that the creature had killed one of the oxen. I went to see the slain animal and found that it was badly bitten about the neck and that one of the thighs had been partly eaten; in its enfeebled state the ox had supplied an easy kill for the big spotted cat. We made no attempt to follow the jaguar but shouldered our guns and started on the home stretch of the long journey. Again it rained heavily, though intermittently, and frequently the mud was knee-deep; but the knowledge that the river and rest lay but thirteen kilometers away acted as a stimulus to the men, and even the weary animals responded to the ceaseless urging of their drivers and panted along as if they, too, understood that the end of their toil was at hand.

At about four o'clock that afternoon our destination was reached. From the top of a rather high hill we had an unobstructed view down the wide, newly cleared lane through the forest; a small cluster of mud-walled, palm-thatched huts nestled in the depression at the foot of the hill, with a patch of corn and rice growing to one side; a hundred yards beyond sparkled the river, and on all sides of the little clearing rose the Amazonian forest. The little building housing the telegraphic equipment was placed at our disposal, and tents were erected for the *camaradas*, who straggled in until a late hour with the foot-sore pack train. The animals were given their liberty and bountiful feeds of corn and fodder, so that within a week many of them were in condition to start on the back trail, a comparatively easy trip, as there were no heavy loads to carry. Many of the natives were also sent back, while others were retained in the service of the expedition; one detachment was sent to the camp of the laborers who were working on the telegraph line, which extended two kilometers beyond. This was the end of the survey, Barão de Melgaço being the name of the last station, and a force of about fifty men were engaged cutting the opening for the continuation of the line. At the rate they were working it was estimated that the line to Manáos would be completed in about two years.²

We had expected to find a craft of some kind awaiting us so that we might immediately pursue our journey down the river, but in this we were disappointed, although, as it later developed, a boat was then on its way to us, sent by order of Colonel Rondon. There were only two small dug-outs available, which were entirely inadequate for our purpose, so the men

² The line was completed by the end of 1914. See "Completion of Colonel Rondon's Explorations in Matto Grosso," *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, p. 693.—EDIT. NOTE.

were put to work cutting down a tree of large size and hollowing out a canoe which would hold the party and the necessary luggage. This work we estimated would take some weeks, so in the meantime we busied ourselves exploring the country in the vicinity of Barão de Melgaço.

A short reconnaissance through the forest revealed a veritable zoölogical wonderland. I was consequently very glad that we were delayed, as this gave me an opportunity to study the fauna of a zoölogically unknown region and to work on some of the problems of nature with which we are constantly confronted but of which so little is known. One of the facts that no field naturalist can fail to have thrust upon his notice is the exact precision and nicety with which the balance in nature is preserved. Take the familiar example of the oyster. In its early stages of development, it is subject to the raids of such a host of enemies and adverse conditions that out of a million eggs only a few bivalves reach maturity; to offset this wholesale destruction, nature has provided that a single oyster may lay several millions of eggs, and thus the race is preserved. Birds, to a less extent, are subject to this same thoughtful provision; therefore, we find that the species which are subject to many dangers during the nesting period and which undertake long, perilous seasonal migrations, lay comparatively large sets of eggs; this is best evidenced by ducks, geese, and swans. Species which are subject to the natural dangers of migration only and are protected during the nesting season, comparatively speaking, rear small broods of young; warblers, thrushes, and a number of our own native birds would come in this category; to further offset the loss, some of these latter may even rear two broods in a season. When we reach the tropics a marked change is noticeable; the extremes in climatic conditions are usually represented by the wet and dry seasons; there are few enemies and food is abundant, consequently the loss of life is comparatively small. If reproduction proceeded there at the same rate as in the northern lands, it must be obvious that the country would soon be overstocked; but again, it has been decreed that the equity should be preserved, and the great majority of tropical birds nest but once a year, and then the full complement of eggs is but two. Of course, there are a number of exceptions on each side, and on such matters it is difficult to generalize, but, in the majority of cases, this will be found to be true.

On one of my walks in the forest I came upon a troop of peculiar little monkeys of the saki family, feeding in the top of a tall wild-fig tree. They differed from all other known members of the genus by being entirely black, with snow-white noses. While feeding they were quiet, and the only thing that betrayed their presence was the constant pattering of small particles of fruit upon the dry leaves carpeting the ground. Presently they took fright, and away they went in a series of leaps and bounds, so that the tree tops were agitated as by a violent gust of wind; they uttered queer little whining squeaks as they ran and soon disappeared from view. A small

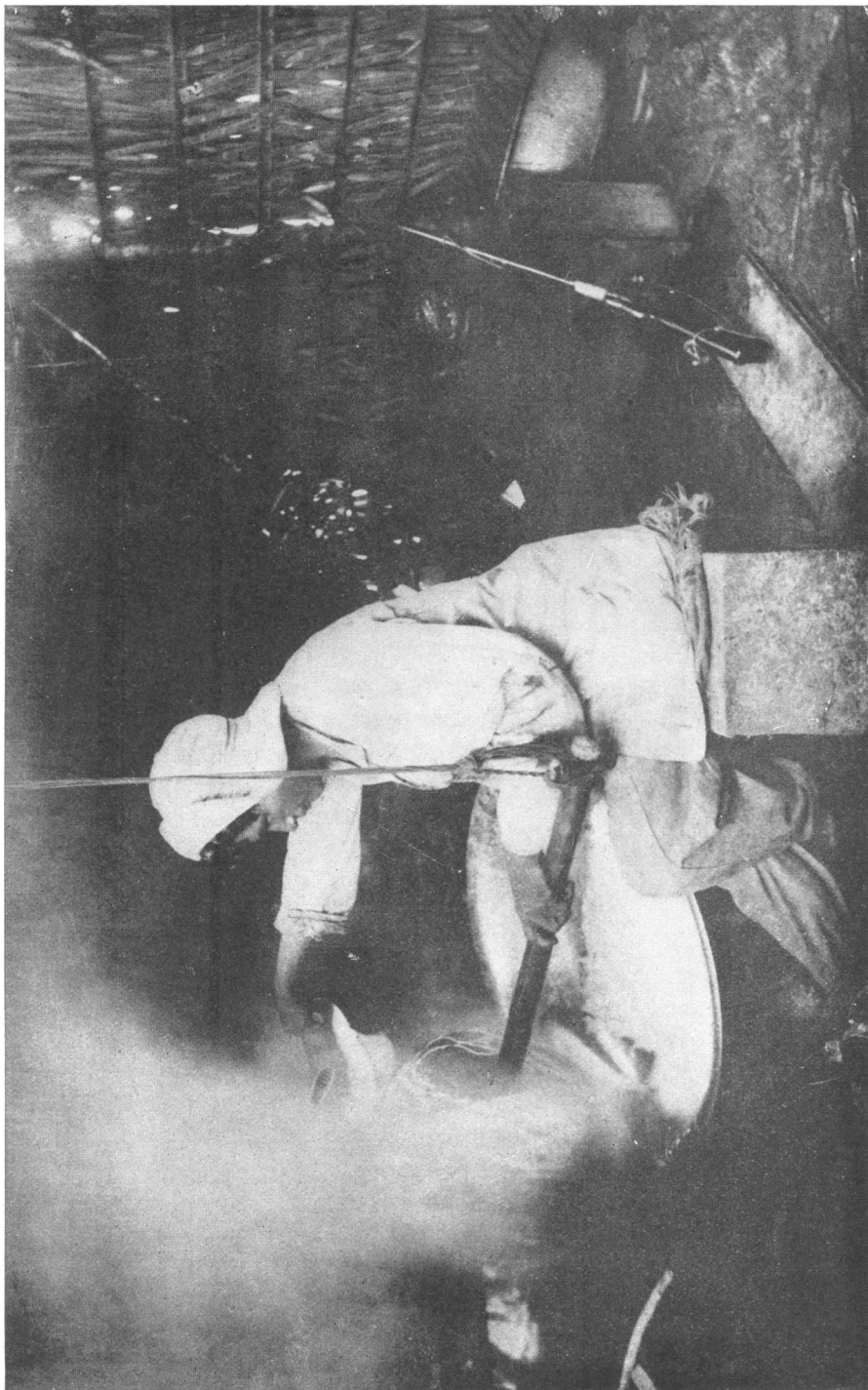


FIG. 2—Smoking rubber on the Gy-Paraná.

A flat-bladed paddle is covered with a thin layer of the latex of *Hevea brasiliensis* and turned gradually in the smoke of burning palm nuts or palm wood. A large ball of smoked rubber gradually accumulates, whereupon a slit is made to release the paddle. The paddle is controlled by the left hand and forearm thrust through the loop of a rope suspended from the roof. (Photo by Tinba.)

one of the same species which I owned was a most amusing little pet and never failed to gain a place in the affections of anyone who beheld it—even the most calloused *camarada*; it was of a most playful and friendly disposition and, if petted, made the most ridiculous faces and bubbled with laughter. Another monkey that was common in the forest was a species of *Ateles*, or spider monkey, which is very appropriately named on account of its slender build and long, wiry arms and legs; it also is of a black color, and swings its way through the branches much after the order of a gibbon, although it lacks the latter's agility. The Indians are very fond of this species, both for food and as pets; but whatever epicurean merits may attach to the flesh, in appearance the creatures are most repulsive. The face is pinched and drawn, with a long-suffering expression about the eyes, while a tuft of long, stiff hair extending over the forehead like a ragged cap gives it a greater look of misery and grotesqueness. One specimen which I collected measured six feet two inches from the tips of the fingers to the tip of the tail.

Birds were not uncommon but rather hard to observe on account of the density of the vegetation. Near the river stretched a wide band of bamboo, beautiful to look upon but impossible to penetrate without the aid of a machete. Just beyond, the trees grew tall and in close proximity, giant *castanhas*, *Heveas*, and ironwoods intermingling their branches to form a canopy of deepest green, impervious to sunlight and through which rain filtered slowly; palms, ferns, and thorny shrubbery formed a dense undergrowth, so that progress at best was slow. From all sides came the clear, ringing "*hoo-weet-weet-hoo*" of the gold bird, or whistling *cotinga*, often misnamed the bell-bird; and although the sound came from but a few feet overhead, it was usually impossible to locate the dull, slate-colored songster perched motionless on a well-screened branch. The smaller species of birds traveled in large flocks, doubtless deriving some mutual benefit from this mode of living; usually the band was preceded by a few scouting brown woodhewers, some with slender bills four inches long bent in a half circle, flitting silently from trunk to trunk, lighting low down and running up rapidly, while they searched the crevices in the bark for insects; then came the vast host of vireos, warblers, flycatchers, tanagers, and woodpeckers, completely investing the trees in their all-absorbing quest of a livelihood. Twigs snapped, seeds dropped, the woods seemed full of fluttering wings and chirping voices; but in a few moments the noise grew faint and stopped; the tireless army had gone its way, and the vanguard of trogons, resplendent creatures with blood-red breasts and metallic green backs, suddenly appeared, hovered in mid-air to snap off an enticing fruit, and then hurried away. Occasionally we were fortunate enough to shoot a curassow, a large turkey-like bird, and then our Brazilian chef prepared the national dish called *canja*; it consists of a fowl and rice boiled together and is delicious.

Work on the dug-out progressed slowly, on account of its large size; a section of the trunk, some thirty feet long, had been cut off where the tree had fallen, and this was being hollowed out with adzes, while short-handled axes were used in dressing down the exterior. After twelve days of continuous hewing the dugout began to assume the appearance of a seaworthy craft, and we figured that she would be ready to launch at the end of another two weeks; but the next day a *batelão* arrived. Her captain had been fighting his way up the Gy-Paraná over three months in his efforts to reach Barão de Melgaço, having been sent from the Madeira by order of Colonel Rondon.

We loaded our meager outfit into the *batelão*, which was a good-sized craft built of boards nailed over heavy wooden ribs, and with a squared tree-trunk for a keel; an arched palm-leaf roof covered a section in the center, under which we sat to avoid the rain or sun. This style of boat is in general use on the larger tropical rivers and corresponds with the *piragua* of the Orinoco and the *champan* of the Magdalena. A crew of eighteen men was mustered, all of whom were more than willing to leave their pestilential environs, and we were soon shooting downstream with the rapid current. Captain Amilcar had gone on ahead with the small canoes in order to survey the river. They carried a sighting rod with red discs and a telemeter for measuring distances; a compass gave them the direction.

A quarter of an hour after starting we reached the camp of the telegraphic commission and made a short stop to take aboard a number of men who were suffering with fever and beri-beri; shattered wrecks of humanity whose only hope of life lay in flight. I saw a number of the *camaradas* who had come across Matto Grosso with us, and it was surprising to note the great change which only two weeks in the steaming, insect-infested forest had wrought; several of them were already suffering from violent attacks of malaria, and their faces were colorless and sallow; others who had been in the region longer stared at the *batelão* with sunken, lustreless eyes in which not even a vestige of interest in our visit or of hope was evident; a few had apparently reached the stage where the sight of the twelve newly made mounds on the hill-top no longer aroused feelings of dread or apprehension but rather of indifference tempered with longing for a welcome release.

The Commemoração, the headwater branch of the Gy-Paraná on which we were, is a deep river from three hundred to a thousand feet wide, with reddish water and a swift current. It was not necessary for the men to ply the oars except when rounding some short bend where steerageway was required, and this was fortunate, as it rained so much of the time that the men were glad to seek the protection offered by the covered portion of the boat. In the intervals between the deluging showers the sun blazed down mercilessly; trees on both sides of the narrow lane of water sparkled as if bedecked with jewels. In places the forest rose from the river's edge in

sheer walls of variegated green; tree-trunks, brush, and palms united into one solid battlement by mosses, climbing lilies, and ensnaring creepers. Again, clumps of graceful ita-palms leaned far out over the water and then rose in a series of stately, feather-crowned columns. At frequent intervals we had glimpses of the animal life that lurked within the impenetrable barrier of the forest fastness. Monkeys were especially plentiful, and within an hour after starting we had seen four distinct species, representing as many families; there were files of howlers, the males jet black, while the females are of a straw color, moving leisurely through the branches; troops of dainty squirrel-monkeys, with deep chestnut backs and grayish heads and white faces, scampered over the tops of the lower trees. Black spider-monkeys sat in the highest crotches and gazed down at us in stupid perplexity; and once we startled a family of woolly little night-monkeys of a grayish color which had selected a thick clump of overhanging vegetation as their diurnal sleeping place. Large flocks of blue and yellow macaws, flying two by two, crossed the river high overhead, doubtless on their way to some choice feeding-ground. Kingfishers sped away in front of the hurrying *batelão*, and from the depths of the woods came the muffled sound of an ivory-bill's tapping on a hollow trunk.

That night we reached the junction of the rivers *Commemoração* and *Pimenta Bueno*, the latter a stream not less than a thousand yards wide, with a great volume of water. The river formed by the confluence of these two streams is known as the Gy-Paraná. We had covered a distance of eighty kilometers. In ascending, it had taken the *batelão* nineteen days to cover the same stretch of river that we had just descended in one day.

Of course, the surveying canoes could not travel at this rapid pace, so the two parties became separated. In the very beginning Captain Amilear's party had suffered an accident which came near ending fatally for several of the men in his canoe. Their work necessitated frequent hauls, and to bring the dugouts to a stop while racing down stream was no easy task; so they had adopted the method of driving them into the vegetation and then holding on to the branches while a sight was taken with the telemeter. On one of these occasions a fer-de-lance, the most deadly of all South American snakes, fully seven feet long, was shaken from the overhanging brush and fell into the canoe; the panic-stricken crew leaped into the water. Captain Amilear retained his presence of mind and shot the snake, but in the meantime several of the men had been swept down stream and were on the verge of drowning before he could reach them; the geologist had gone to the bottom, but was rescued and revived with some difficulty; thereafter he traveled with us in the *batelão*.

There were numbers of small alligators in the river, not over four feet long, called *jacaretinga*; later on, we had the cook prepare one, as they were said to be good to eat. The flesh was of a white color, when cooked, and



FIG. 3.



FIG. 4.

FIG. 3—Type of boat used on the tropical rivers and called *batelão* in Brazil and *piragua* in Venezuela. (Photo by Leo E. Miller.)

FIG. 4—São João on the Gy-Paraná during the season of high water. The members of the expedition had to use dugouts in going from one hut to another. (Photo by Leo E. Miller.)

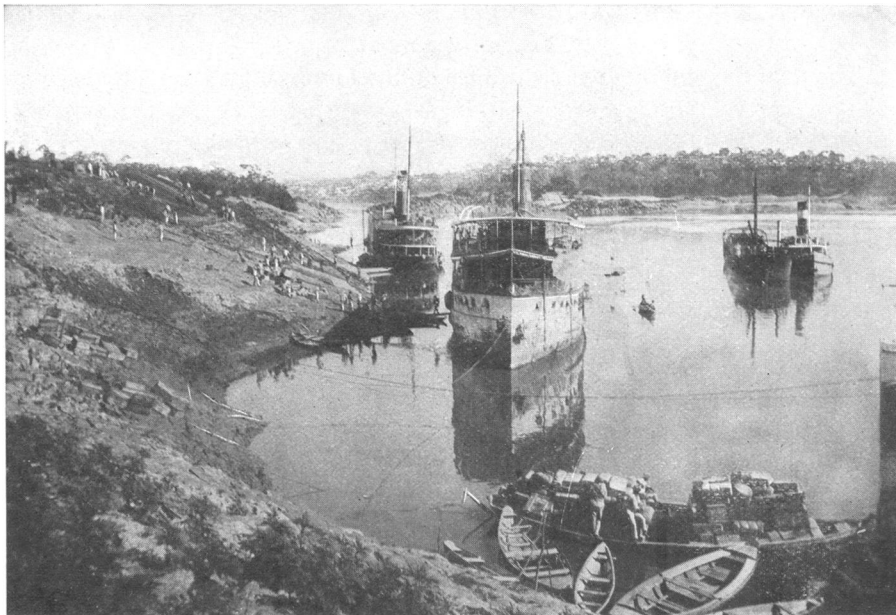


FIG. 5.



FIG 6.

FIG. 5—The port of Santo Antonio on the Madeira. Ocean-going steamships call here regularly, for, in addition to being on an historic trade route, the town is near Porto Velho, the port at the eastern terminus of the recently completed Madeira-Mamoré railroad. (Photo by Tinba.)

FIG. 6—Rubber spread out to dry, Gy-Paraná. (Photo by Leo E. Miller.)

tender, but it possessed an objectionable, muddy flavor, so that we could eat but little of it; however, the natives liked it.

The next day we covered a distance of one hundred and eight kilometers. The current in the Gy-Paraná is not so strong as in the *Commemoração*, but, the weather being fair, the men pulled at the oars steadily during the twelve hours' travel with only short periods for rest and refreshment. All meals were cooked aboard, on a fire built on a box of sand in the prow. Insects were not particularly troublesome, as we kept to the middle of the stream, which, receiving the water of numerous good-sized tributaries, was constantly growing wider. There were abundant signs of the close proximity of Indians on both sides of the river. We saw some palm-leaf lean-tos used for overnight stops, with the charred sticks of a campfire in front; where the water eddied slowly against a crumbling bank, bamboo stakes protruded above the muddy stream—remnants of an ancient fish-trap,—and occasionally we passed a small, cleared spot, now overgrown with rank weeds and second-growth sprouts, which marked the site of an old plantation.

Realizing the importance of the good-will of the wild folk of whose existence in the surrounding forest there was such abundant evidence, the Brazilian government had erected a number of small bamboo and palm-leaf sheds various distances apart, near some of the more recently used trails that led from the water into the dark jungle. Under each rough lean-to a bench, made of long poles laid across sticks driven into the ground, had been built. It was the custom of the officials in going up or down the river to stop at each of these stations and place beads, knives, and trinkets on the benches as a peace-offering to the Indians; but so reticent had been the latter that not one of the articles had hitherto been touched. Great was our surprise and joy to find that all the precious offerings had been removed, and that the Indians themselves had left a number of tokens of friendship in return. There were arrows six feet long, beautifully adorned with the bright-colored feathers of trogons, toucans, and other birds; parcels of Brazil nuts neatly done up in leaves; a few ears of maize, a feather head-dress, and a small pottery bowl. We collected all these treasures and left many more presents in exchange.

As we neared one of the last stations, the sound of loud hallooming came from the forest on our right. We swung the great *batelão* toward the shore. We landed, but no sooner had we climbed to the top of the steep bank than we realized how cleverly had been arranged the plan by the Indians to affect a meeting with the mysterious strangers who had invaded their realm. We followed a wide path that led into the dense forest for a distance of twenty yards and suddenly came upon a small, swift stream that sped through a dark tunnel-like opening under the dense canopy of leaves and branches. As we stared in blank amazement into the impenetrable tangle of vegetation on the other side of the stream, there emerged from the forest four nude, bronze figures, gesticulating wildly and chatter-

ing in a strange jargon which of course we could not understand; they were of good build, though inferior in physique to the Nhambiquaras we had seen on the *chapadão*, and not over five feet tall, with long, straight hair, and, remarkable though it is, the tangled hair of two of them was of a

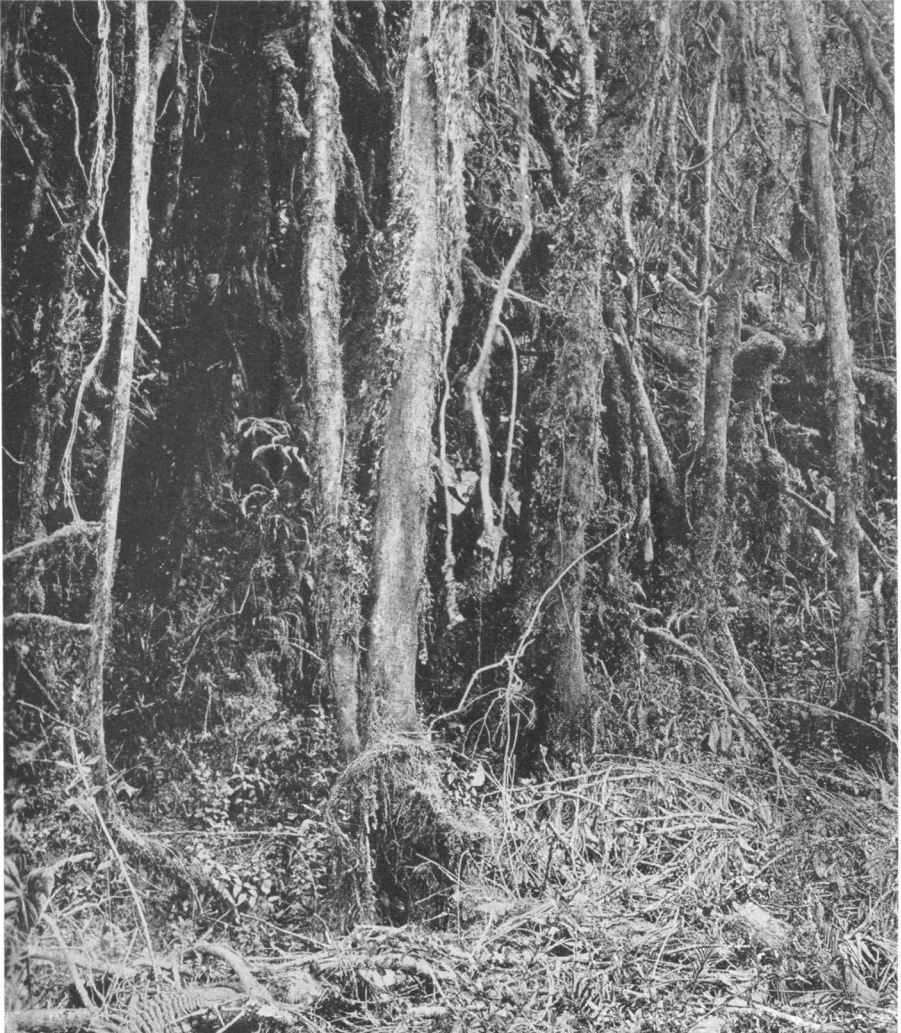


FIG. 7.—The dense wall of the tropical forest. (Photo by Leo E. Miller.)

decided auburn color. Their bodies were plentifully besmeared with dark bluish paint, applied in queer zig-zag designs and giving a grotesque effect. No wilder scene can be imagined than the quartette of naked, trembling creatures faintly outlined against the dim background of merging shadows and somber green; somehow they seemed to fit into the picture and to

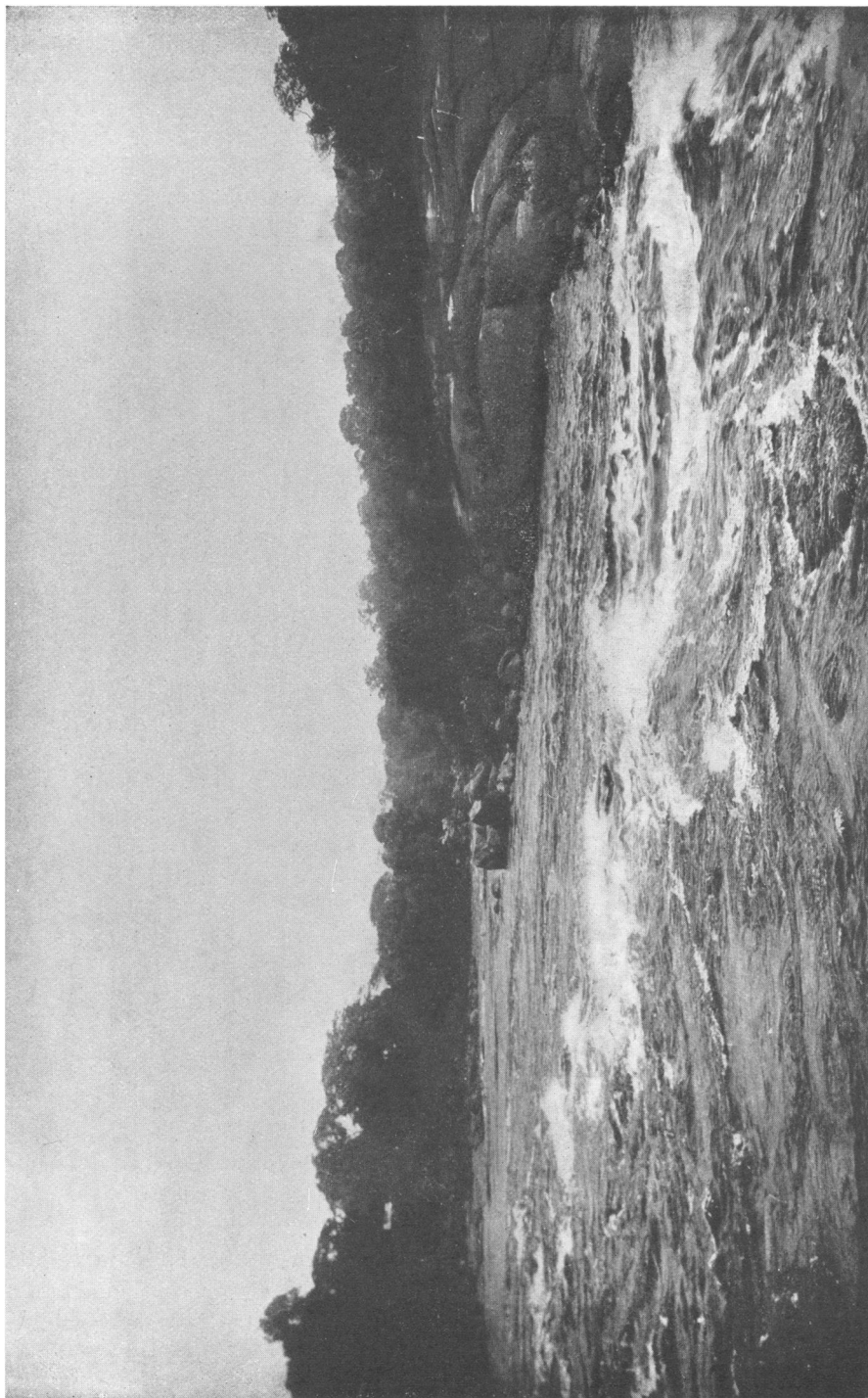


FIG. 8—Rapids of São Vicente on the lower Gy-Paraná. (Photo by Tiniba.)

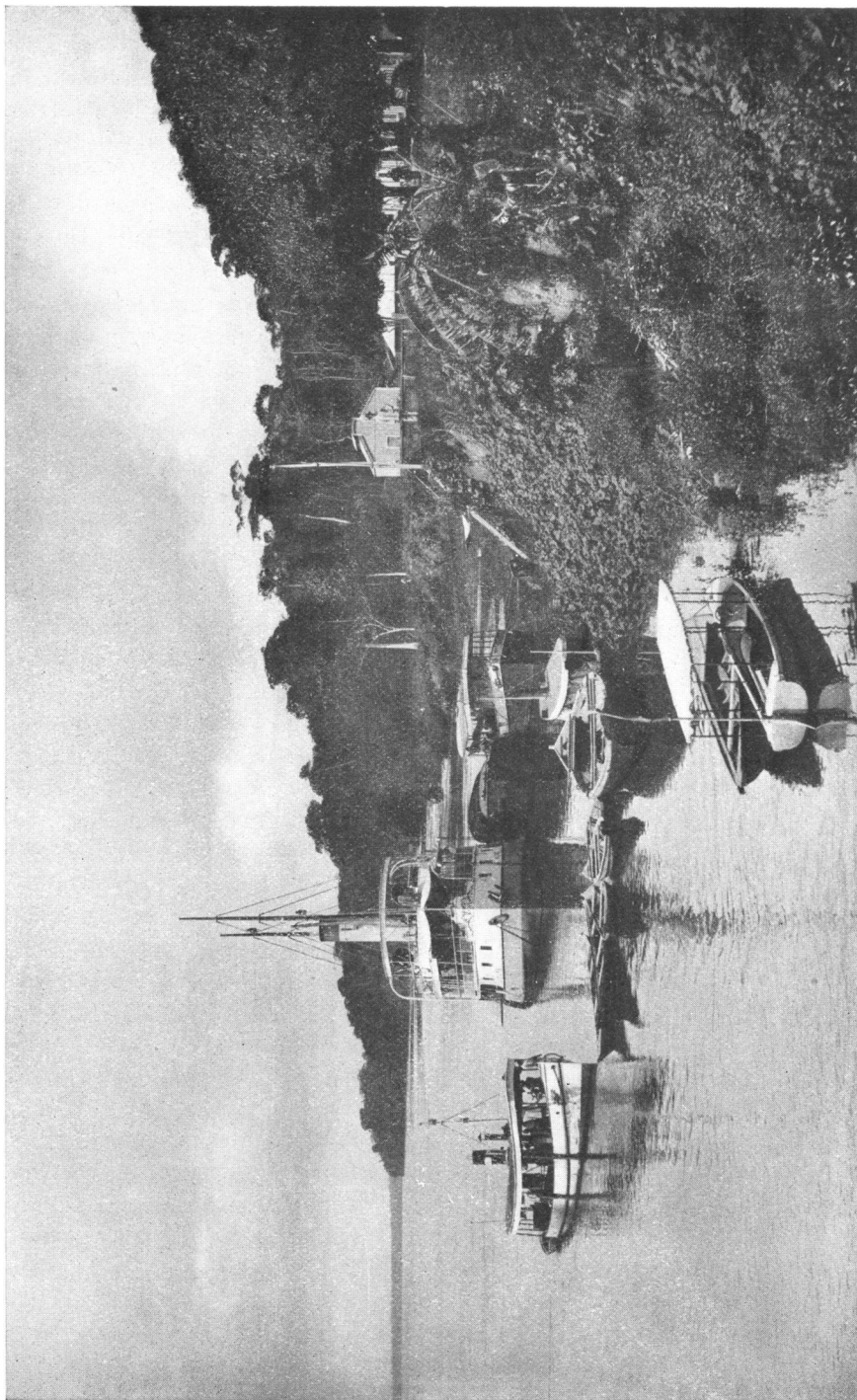


FIG. 9.—Calama on the Madeira, the expedition's headquarters during its reconnaissance on that river. (Photo by Tinba.)

complete the impression of primality conveyed by the vast wilderness of the Brazilian hinterland. Our captain had held up bunches of bright red beads and started to wade into the stream towards them, but they immediately withdrew into the thick cover, so he came back. A moment later they reappeared and again began talking and waving their arms; by signs we tried to induce them to come nearer and to assure them of our peaceful intentions. Finally, after a *pow-wow* with his companions, one of their number approached to the margin of the stream and held out his hands. He then pointed to one of our men and motioned for him to take off his clothes and come over with the presents, which was done; the Indians grabbed the trinkets from the native's outstretched hands, gave him a violent push back and fled to his companions. This was repeated a number of times. Then we refused to permit our man to go farther than the center of the stream—the water was nearly up to his chin—and after lengthy entreaties the Indian waded out and met him half-way. We laid out an attractive assortment of beads, machetes, hatchets, and brightly-colored trinkets on our side of the river and, retreating ten or fifteen feet with extended arms, invited the Indians to come over. Slowly they came, apparently with many misgivings. We approached them in a friendly manner; they made no attempt to flee, but cast meaning glances behind them where, obviously, an armed force was concealed nearby to protect them in the event that our actions aroused suspicion. The chief was an intelligent fellow; his first deed was to enact before our eyes a drama that we shall never forget. Assuming a rigid pose, he pointed straight in front of him with one hand, as if taking aim; then with a sudden “*pong*” he clutched at his breast and fell upon his knees, gradually sinking to the ground, where he lay moaning. We understood the accusation; one of his tribe had been shot to death by our people, probably by a rubber collector farther down the river; that was the reason why they had mistrusted us. We showed them how to use the machetes and hatchets, and they seemed delighted; but when we demonstrated the use of matches their joy knew no bounds; they yelped and danced, made weird grimaces, and tried to set the trees and bushes afire, like so many monkeys. Finally, upon our urgent invitation, the chief shouted a guttural command, and three more savages appeared instantly and joined the group, making seven in all; the late arrivals were also treated in a generous manner, and then we withdrew to our boat. Before leaving, however, we promised to return and bring more machetes and matches, which they seemed particularly to appreciate, and they in turn promised to have the bench in the palm-leaf shed heaped with bows and arrows and other things of their making, promises which were religiously kept on both sides.

Our next halt was forty kilometers farther downstream at a rubber camp known as *Urupá*. There were several palm-leaf huts standing on a slight elevation, so we took our hammocks and mosquito nets and spent the

night ashore. Traveling eighty kilometers the next day, we reached another rubber camp called La Pena. The surrounding forest was magnificent, and it was said that a footpath led far into the interior to the site of an old Indian village, so I decided to remain at this point a few days to collect. However, a short walk down the trail soon showed that this plan was not feasible; the whole forest was inundated to a depth of several feet, and there were so many fallen trees and clumps of thorny undergrowth that hunting was out of the question.

The next day we reached Monte Christo, the depot of a large rubber concern which has its headquarters on the Madeira; about one hundred men had congregated here to await the coming of the dry season, when they would begin collecting rubber latex from the *Hevea* trees which abound in the forest. Several long, thatched sheds housed the waiting crowd; hammocks were strung from every available post and rafter, giving the interior a cobwebby appearance, and around the edges of the huts, protected from the rain by the low, ragged roof of grass and leaves, numerous small fires smouldered over which the men boiled their rations of beans or *farinha*. There were pure blacks, descendants of slaves who had been imported into Brazil from Africa many years before; also Indians, Portuguese, and men in whose veins flowed the blood of all three of these races. Many of them were ill with fever, and had large, vile-looking ulcers or "jungle" sores, which are said to result from the bite of a small fly. This was not surprising, as the place was entirely surrounded by pools of black, stagnant water from which clouds of mosquitoes hatched, and no sanitary precautions whatever were taken against infection.

The natives are very fond of pets, and numbers of animals taken from the forest while young were enjoying their full liberty but never ventured far from the houses. There was a collared peccary, full grown and very amiable, which liked to be petted, and emitted short, low moans and grunts when anyone was near it; three curassows, dignified but restless, spent much of their time preening their feathers on a half-submerged log—they were beautiful creatures of a deep blue-black color with white underparts and a wonderful curled crest. A pair of trumpeters strutted about the camp; monkeys of the *Cebus* family and parrots of several species climbed about in the network of hammocks and added their chorus of screams and squawks to the general confusion.

We had to leave the *batelão* at Monte Christo on account of the cataract which obstructs the river at this point and carry our luggage around for a distance of half a mile. Below the rapids we found another craft similar to the one we had just left—perhaps a trifle larger—and towed by a small wood-burning launch. On the 18th of March all our things, and the sick men, several of whom were in a serious condition, were carried aboard the waiting *batelão*, and the next morning again found us on our way. The Gy-Paraná was rapidly becoming a vast, muddy sea, comparing favorably

in size to some of the larger affluents of the Orinoco, such as the Caura and the Ventuari. The character of the vegetation remained essentially the same, but some of the creepers that drooped from the tall trees and trailed in the water were covered with clusters of yellow, pink, and pale blue flowers. We saw and heard little of the animal life, as we traveled too far from the banks. In the afternoon a violent wind-storm blew up the river, accompanied by a terrific down-pour.

Soon after the storm cleared we reached São João, another rubber camp not unlike Monte Christo. The water was so high at this station that we had to use a canoe in going from one hut to another, and the whole place reeked with pestilence. It is infinitely more dangerous to traverse country of this kind than to pass through an entirely uninhabited region; the huts are fertile propagators and harborers of contagion of all kinds, to say nothing of the danger to which one is exposed on account of the more or less constant mingling with the natives. Just below São João the river is again broken by rapids; we rowed down to the beginning of the turbulent water in a canoe and then carried around to the foot of the falls. The distance is not great, but we had to cross a high, rocky hill so that we were delayed a day in making this portage. The rapids are called São Feliz and are of a formidable character, as the bed of the river is dotted with huge granite boulders over and among which the water rushes with a roar that can be heard half a mile away. During the dry season these rocks are exposed by the receding water and left covered with a thin scum of mud impregnated with salt; it is said that parrots, parakeets, and macaws then come in thousands to eat of the saline deposit, and that they become so tame great numbers of them are killed with sticks and eaten by the rubber collectors. I saw two macaws nearly three feet in length, and of a blood-red color with blue and golden wings, that had been caught the previous year; they were magnificent creatures, but had the curious habit of spending the entire day squatting in a dark hole under the floor of their owner's hut, coming out only when hungry and at night, when they climbed to a perch above the door to sleep.

At night our men indulged in a curious native dance which I had never seen before in South America; they collected a great heap of wood and soon after supper had a roaring bonfire going; then they formed a circle with one man in the center who began to sing in a high, strained voice, and after each line the whole chorus answered with a wail that sounded something like "*oh-tee-oh-tee-ah.*" The center man bowed and hopped about on one foot in a most ridiculous manner and made frequent, sudden charges into the surrounding brigade, and if he succeeded in knocking one of them down that man took his place in the middle of the ring. The whole performance looked very much like an imitation of a cock-fight. Some of the onlookers had rattles made of small calabashes full of pebbles stuck on a short piece of bamboo which they shook in rhythm with the singing; they

seemed perfectly insatiable of this form of amusement, and the dancing and howling lasted far into the night.

Below São Feliz we found another small launch, towing a *batelão* which, in the course of a day, took us to a camp called Tabajara. We had not gone more than a few miles the next morning when further progress was again barred by rapids. After a short walk we crossed a branch of the river in small dugouts and then started on a two-mile portage through the flooded forest. Another launch was waiting below the rapids, but within twenty minutes after weighing anchor we again heard the roar of troubled waters ahead of us; the river raced between high, rock-strewn banks like a brown stream of molten glass. In the distance we could see sinister flecks of white dotting the surface, while a cloud of mist hung like a pall over the river; but beyond the veil that obstructed our further view came the ominous roar of a great cataract, growing in intensity as we drew near. The landing was about a hundred yards above the brink of the first fall, but the current proved to be too strong for the launch's little engine, and we were in danger of being swept past; the moments that followed were exciting, but fortunately we managed to reach the bank. This same thing had occurred but a short time before, but the result had been disastrous; the boat was swept over the falls, and, of the thirty-one men aboard, twenty-seven were never seen again. The portage around these rapids, called São Vicente, was about a mile and a half in length and led over gently undulating country, though all heavily forested. In many places the bed rock had been uncovered by the torrential rains. This consisted of fine-grained, dark granite; naturally there was a shallow layer of sand on the rock, with a thick top covering of rich, black mould. From the top of a high knoll we had a fairly good view of the falls and of the rapids below; after leaping over a twenty-foot ledge, the river rushes through a narrow rock-filled gorge; enormous boulders tower out of the channel like so many black, unvanquished monarchs. Tongues of spray leap to a height of forty feet, and clouds of vapor rise in a constant stream. With the exception of the Salto Bello of the Rio Sacre and Utiarity Falls of the Papagaio, we had seen nothing to compare with São Vicente during our entire journey across Brazil.

That night we reached the first settlement, a small village named Doze de Novembro. We arrived tired and wet, for it had rained the greater part of the afternoon, but we congratulated ourselves upon having performed a remarkable day's work.

The place was overrun with ants, not the comparatively harmless *carregador* ants which are content to carry away your clothing piecemeal while you sleep, but with endless armies of the fierce, black carnivorous species that prey upon every living being. These ants are one of the scourges of the tropics; whether in the fever-stricken Chocó on the west coast of Colombia, at the base of Duida on the Orinoco, or in the wilds of

Matto Grosso, the ravaging hordes seemed always the same. One moment they hurry along in solid formations, the next, side-lines have been thrown out in all directions covering many square yards of ground. Not one leaf or crevice escapes the alert scouting parties, which ascend even to the top of the tallest tree. When a victim is discovered the news in some mysterious way is flashed to the main column, and battalions of reinforcements immediately rush to the encounter, charging the prey and clinging with vise-like mandibles to any part of its body that offers a hold. Usually the approach of the devastating host is preceded by a swarm of panic-stricken insects, crawling, hopping, and flying in their endeavors to escape destruction; large, hairy tarantulas crawl to the tops of bushes and leap from leaf to leaf only to be discovered and routed, until in despair they spring to the ground, which by this time is one surging mass of ants, where they are despatched in short order. I have seen scorpions, and centipedes eight inches long, suffer a similar fate; no living thing seems to escape the avalanche of destruction. Flocks of ant-birds usually follow in the wake of the army, feeding upon the ants and upon the insects that have been driven from their hiding places. One of the questions that naturally arises in this connection is how the callow young of birds escape from the ants, as caged birds are not immune from their attacks, and dead or wounded birds placed near the army's line of march are quickly discovered, torn to shreds, and carried away. While in British Guiana, I had been watching the nest of an ant wren containing two helpless young, placed in the crotch of a tree a few feet above the ground, for several days; one morning the whole region was swarming with ants and the nest was empty; however, not long after, and also on subsequent days, both parent birds were seen contentedly carrying food into a thicket fifty yards away. A casual search failed to reveal the new nest, but to my mind there was no doubt that the young birds had been removed upon the approach of danger; one of the adults was marked in a peculiar manner so that there was no mistake in the identity of the pair. Doubtless this was an exceptional case, and in the vast majority of instances young birds perish in common with the other creatures which are overwhelmed by the ants.

On the day following our arrival at the little village, we boarded a waiting launch sent from the Madeira to meet us—the *Jayme*, she was called—and started on the final stretch down the stream; within an hour we reached the boundary line of Matto Grosso and entered the great state of Amazonas. The Gy-Paraná had assumed the proportions of a mighty river; it is doubtless one of the largest, if not the longest affluent of the Madeira, and frequently the distance between banks was not less than half a league. The water was yellow and there was little current; frequently we ran into drifts of floating trees, branches, and patches of grass that had been washed out of the flooded areas. There was no opening in the tall, tropical forest which stretched into the distance and disappeared

in one long, unbroken vista of deepest green. Toward evening we reached the mouth of the Gy-Paraná, and entered the vast muddy expanse of the Madeira; we crossed to the other side and landed at a small port called Calama, the home of Senhor Asensi, owner of the rubber camps we had passed on the last days of our journey down the river. Senhor Asensi very courteously placed his comfortable home at our disposal and suggested that we remain as his guests until we had in some measure recuperated from our rather trying experiences, and we were glad to accept his hospitality. Practically every member of the party had suffered from frequent and severe attacks of fever, although half a gram of quinine had been taken by each one daily, and some of the *camaradas* were so ill that they had to be carried ashore; the latter were sent to Manáos for medical treatment on the first available steamer. I was particularly eager to spend some time at Calama, as the locality appeared to offer unusual opportunities for zoölogical work. After a few days of thorough rest the Brazilian members of the party started up river to Santo Antonio, for a tour of the Madeira-Mamoré railroad, while I remained to investigate the fauna of the region.

The country back of Calama is high and undulating, so that it remains untouched by the water that covers the lowlands during the wet season. A small space which had been cleared around the building was covered by a fine growth of grass and low bushes and served as pasture for a few head of cattle; small birds, such as flycatchers, grass finches, and tanagers teemed in the opening, and many short-tailed, green parrots squawked in the tree-tops at the edge of the forest. A short distance below the landing there was an extensive swamp and many small brush-covered islands; masses of aquatic plants floated in the quiet, open pools, conspicuous among which was the beautiful *Victoria regia* with leaves four feet in diameter. In the dense tangled vegetation that grew out of the black depths of the murky swamp water we found flocks of *hoatzins*, or lizard-birds, curious archaic creatures which retain some of the characteristics of their reptilian ancestors; they are about the size of a pheasant, of an olive color above and yellowish below; a high crest crowns the head, and they possess only a limited power of flight. It was the height of the nesting season, and many of the fragile platforms of sticks contained two or three yellowish eggs, heavily spotted with reddish-brown; the wings of the young are provided with long, sharp claws which enable them to climb about over the branches like lizards, hence their name.

All traveling through the swamp had to be done in a canoe; and pushing the dugout through the almost solid mass of branches and creepers was a difficult task. Every twig seemed to swarm with small red ants, called fire-ants, on account of the intense burning sensation produced by their bites, and they were constantly dropping upon us in scores. Several times we blundered into *maribundi* nests, and in each instance the outraged wasps

promptly retaliated. Large *iguanas* jumped out of the trees into the water with a loud splash as we passed underneath, and troops of woolly monkeys deserted the wild cashew trees in which they fed and beat a hasty retreat. The swamp was full of life, but we rarely recovered anything we shot; the caymans and *piranhas* with which the water was infested usually snapped up our specimens before we could reach them. At night we set throw-lines and caught the great *pacu*, a fish of the *piranha* family; but unlike its blood-thirsty relative it prefers a vegetable diet. A *pirarucú*, six feet long and weighing two hundred and fifty pounds, was also taken; this is the largest fish that inhabits Amazonian waters; the scales are an inch and a half in diameter and of a silvery color, those of the latter half of the body being margined with deep scarlet.

The forest back of Calama contained about as much game as is ever found in one spot in South America. There were deer, agoutis, and peccaries, but it was impossible to penetrate far into the interior on account of the Parintintin Indians, who make this region their stronghold. These Indians have always maintained a hostile attitude toward the settlers. An attack was made on Calama one day at noon just as luncheon was being served; from out of dead silence of mid-day there suddenly came a shower of arrows; this was promptly answered by rifle-shots from the house, and the Indians immediately fled. Thirty bamboo arrows were gathered up, many of them five feet tall, with barbs on each side of the head; some of the shafts were wrapped with hair and skin taken from the victims of previous raids.

The Parintintins are of medium stature and well built; they are frequently at war with their near neighbors, the Mundrucus; when hostilities are in progress, which is nearly always, the front of the head is shaven, leaving only a round spot of short hair no larger than a silver half dollar in the center; the hair on the back of the head remains long.

The Mundrucus have the curious custom of preserving the heads of the Parintintins slain in battle; one of these I subsequently saw, prepared somewhat in the same manner as those formerly so highly prized by the head-hunters of Ecuador. Apparently the head had been smoked, and the eyes had been replaced with balls of pitch; it was a weird trophy, suggestive of wild orgies and cannibalistic rites performed in the depths of the jungle by the light of flickering pitch torches, and to the music of wailing reeds and deep-voiced tom-toms.

Captain Amilcar reached Calama about a week after our arrival. He had suffered a second accident, in which his canoe, all his personal effects, the instruments and practically all of his scientific data had been lost. These incidents emphasize the uncertainty of travel and exploration on the great South American waterways, and the dangers to which everyone is constantly subjected who ventures beyond the beaten paths of steamships and tourists' routes.

On April 7, the *Fortaleza*, a good-sized steamer plying between Manáos and Santo Antonio, called at Calama on her downstream journey, and we embarked for the last stage of our journey. We made excellent time, stopping only at long intervals for the purpose of taking aboard Brazil nuts. On the 9th of April we entered the Amazon, and the next morning found us steaming up the Rio Negro with Manáos visible in the distance. It had been fifty-two days since the division of the expedition at the River of Doubt.